I claim:

1. A filter comprising:

at least one multiplier to multiply samples of an input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are the convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

at least one adder to add samples of the resulting discrete-time signal.

2. The filter as set forth in claim 1, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.

3. The filter as set forth in claim 1, wherein the input discrete-time signal is a two-bit QAM signal.

4. A modem comprising:

a symbol mapper to provide an input discrete-time signal; and

a filter comprising:

at least one multiplier to multiply samples of the input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

at least one adder to add samples of the resulting discrete-time signal to provide an output discrete-time signal.

5. The modem as set forth in claim 4, wherein the modem is a cable modem.

6. The modem as set forth in claim 4, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.

7. The modem as set forth in claim 4, wherein the input discrete-time signal is a two-bit QAM signal.

8. The modem as set forth in claim 4, further comprising:

a modulator to modulate the output discrete-time signal to provide a modulated discrete-time signal;

a digital-to-analog circuit to convert the modulated discrete-time signal to an analog signal; and

a cable interface circuit to propagate the analog signal on a cable.

9. The modem as set forth in claim 8, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.

10. The modem as set forth in claim 8, wherein the input discrete-time signal is a two-bit QAM signal.

11. A method to provide Nyquist filtering and pre-equalization, the method comprising:

multiplying samples of an input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

adding samples of the resulting discrete-time signal to provide an output discrete-time signal.

12. The method as set forth in claim 11, wherein the multiplication is 2 bit by J bit multiplication, where J is greater than two.

13. The method as set forth in claim 11, wherein the input discrete-time signal is a two-bit QAM signal.

14. The method as set forth in claim 11, further comprising:

mapping frame symbols into two-bit QAM symbols to provide the input discrete-time signal.

15. The method as set forth in claim 14, further comprising:

modulating the output discrete-time signal to an analog signal; and

propagating the analog signal on a cable.

16. A computer system comprising:

a modem comprising

a symbol mapper to provide an input discrete-time signal; and

a filter comprising:

at least one multiplier to multiply samples of the input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

at least one adder to add samples of the resulting discrete-time signal to provide an output discrete-time signal.

17. The computer system as set forth in claim 16, wherein the modem is a cable modem.

18. The computer system as set forth in claim 16, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.